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SECRET

29 February 1972

MEMORANDUM FOR:

SUBJECT : Information for EDAC on the Production of Integrated Circuits in Eastern Europe

1. Attached as S-4178, The Status of IC Production, Technology and Use in the USSR and Eastern Europe, are our replies to specific questions addressed to us by the Chairman of the Economic Defense Advisory Committee (EDAC). This response, which was prepared under a very short deadline, has already been disseminated to the members of EDAC by of your Branch.

2.

Acting Chief, Industries Branch

(29 Feb 72)

SECRET

Excise

The Status of IC Production, Technology and Use in the USSR and Eastern Europe

Question #1.

Does the USSR or any country in Eastern Europe presently produce IC's on a mass production commercial scale? If so, which ones?

Answer

No.

Question #2.

How many IC's are produced in the USSR at the present time?

Answer

Unknown. The information on IC production in the USSR is fragmentary, imprecise, and difficult to evaluate. There appear to be IC development programs underway at four facilities: 1) the SVETLANA electronics plant in Leningrad; 2) an electronics plant in Voronezh; 3) an electronics plant in Zelenograd (near Moscow); and 4) an instrument-building plant in Riga. US visitors have been admitted only to SVETLANA. Additionally, a French engineer and a Yugoslavian businessman have been to Voronezh. Output at SVETLANA has been reported at about 1½ million devices per year; output at Voronezh has been reported at 1,000-4,000 per day or 300,000 to about a million per year. None of these figures

Production of Semiconductors in the USSR and Eastern Europe, 1970

Country	Output (million unit)
USSR	700-1,000 + 1/
Eastern Europe	
Bulgaria	18 2/
Czechoslovakia	39 3/
East Germany	129 4/
Hungary	36 5/
Poland	32 6/
Rumania	22 1/

1/ Mostly germanium.

2/ Most are germanium transistors and diodes except a small quantity of MOS devices being produced under French license.

3/ Mostly germanium; some silicon.

4/ Probably produces more silicon devices than the other countries in East Europe.

5/ Expanding output of silicon devices. Monocrystalline silicon is being imported, in large quantities, from the West.

6/ This is 1971 data. Up to 10% of output could be silicon planar devices.

are official. Furthermore, these are believed to be gross figures and not the useable yield. The Soviets have given no indication of the yield rate for any line. Probably it is quite low.

Soviet IC activity appears still to be in the research and development phase

Question #3.

How many IC's are produced in the Eastern European countries at the present time?

Answer

Unknown. Every country in Eastern Europe (except Albania) has active research and development programs for

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integrated circuits. Czechoslovakia and Hungary have made some prototype IC's. East Germany showed a few samples at the Leipzig Fair for the first time, in 1971. Bulgaria has made some MOS devices.

Bulgaria is manufacturing MOS devices under license from France. Apparently only a laboratory scale capability exists.* Rumania appears to have some capability to produce a small amount of IC's as part of the deal with France to produce the IRIS-50 computer under French license.

Question #4.

Has the US (CIA, DOD, FTD) government identified any piece of Soviet or Eastern Europe military equipment which contains Soviet or Eastern European produced IC's?

Answer

No. During the past two years the US government has acquired, and technically examined, several items of Soviet

* The US corporation Teledyne, has recently submitted an application to Commerce Department to export $10.5 million worth of MOS devices (manufactured by North American Rockwell) to Bulgaria.

military electronics equipment. Many of these items, including a transceiver, a sonobuoy (for ASW), a ship's navigational radar* and a missile were manufactured in 1969 (the most recent date of manufacture of any equipment examined). None of these items were equipped with IC's. The radar and the transceiver were based on tube technology; only the power supplies were solid-state. The other items contained transistors, but with the exception of a silicon rectifier, all the transistors were germanium type. The missile, in particular, an individually launched, optically sighted missile with infrared homing capability -- probably would have had its electronic circuitry designed around integrated circuits had they been available.

It would appear that, as of 1969 at least, the USSR was not using IC's in military electronic equipment. Moreover, the almost exclusive use of germanium transistors suggests that silicon planar manufacturing techniques for transistors may not have been well advanced.

No East European military equipment is known to have IC's.

* This radar has been noted only on merchant vessels. However, it is perfectly suitable for use in naval vessels. Similar, and older, navigational radars are in use in the Soviet navy.

Question #5.

Has the US government identified any piece of Soviet or East European civilian equipment which contains Soviet or East European produced IC's?

Answer

No civilian equipment containing IC's made in the USSR or Eastern Europe has ever been examined by any agency of the US government.

Bulgaria has indicated that it will produce a RYAD model using Soviet IC's. No such production is known to have begun. Some Western visitors to the USSR claim to have seen prototype instruments containing IC's. No such instruments are known to be in production.

Question

Does CIA believe that the Soviets have manufactured IC's on a laboratory basis for high priority military equipment?

Answer

A firm that ran destructive tests on Soviet-made (1969) hybrid thin-film circuits (with inserted discrete transistors) indicated that the USSR attempted (with partial

success) to radiation harden the device. This indicates that the USSR was attempting to design hybrid devices for military end-use. However, we have no evidence that the USSR is actually producing IC's on a laboratory basis for military applications.

Question #7.

What further information is available on Poland being designated by CEMA as the semiconductor producer for the RYAD series?

Answer

The Soviets have never explicitly announced that Poland has been designated the CEMA producer of IC's for the RYAD computer. It is reported (the major producer of semiconductors in Poland) that Poland has been assigned the task of conducting the "major" semiconductor research and development effort in the "Soviet Bloc". In 1971 the Soviets announced that Poland and the USSR would jointly carry out research in semiconductors. And in September 1971, the Polish representative to CEMA stated that the USSR and Poland would jointly develop a number of articles (unidentified) essential for the manufacture of computers.

Question #8.

Does CIA believe that this technology may be passed to Soviets and/or other Eastern European countries if the Poles get the technology from the French/UK?

Answer

We do not know what is involved in passing on "technology" to another country. Presumably some "know-how" could be passed. To the extent that the Soviet difficulties in IC manufacture are related to the quality of the equipment in use, Poland's ability to help the USSR in its IC program might be limited. A plausible alternative, from the Soviet point of view might be to simply import the finished devices from Poland.

In addition to the evidence cited in answer #7 of the close working relationship in the semiconductor area now existing between Poland and the USSR, the following quotation of the Polish Minister of Foreign Trade concerning Polish Soviet technical cooperation, is of interest.

> "Economic, scientific and technological cooperation plays an important role in Polish-Soviet relations. Within the framework of this cooperation, Poland receives from the Soviet Union technical documents and product samples. Our specialists constantly travel to the USSR to work and to acquaint themselves with Soviet scientific

and technological achievements on the spot... In our turn, we send copies of our technical and scientific projects and all sorts of documents to the Soviet Union. Soviet specialists also visit our country and we give them every help and share our experience with them."

Finally, we know that in one important area of electronics in which the Soviets have had prolonged difficulty in keeping up with the state-of-the-art -- oscilloscopes -- there is a joint Polish-Soviet development effort. Polish engineers work in Moscow with their counterparts and vice-versa.

It would appear, at the minimum, that the Soviets would have full access to any Western IC technology acquired by Poland. It appears probable that Poland would pass on any "passable" technology to the USSR.

Question #9.

Does CIA believe or question French assertions that the Poles will be able to have a mass production IC plant even if the cases are denied?

Answer

We do not believe that Poland will be able to mass produce IC's by 1975 without Western assistance. The small development effort that now exists in Poland is based, primarily, on Western equipments that have been acquired illegally. These purchases have not given Poland command over the industrial "black magic" that is crucial to the manufacturing process. Despite intensive efforts over several years duration, Poland was never able to develop a mass production capability for silicon planar transistors. Although France has provided Poland with this starting point, they still do not have all the processing know-how needed to move into large-scale production of IC's. The current Polish effort to acquire this "know-how" from France and the UK is implicit evidence that Poland is not optimistic about the chances of producing high quality IC's, on a large-scale, by 1975 from its own resources.

Question #10.

List countries which are believed to have pilot production lines for IC's.

Answer

See answer #3.

Question #11.

Expand briefly on the levels of IC production in other Communist countries (include Poland) found on pages 5 and 6 in Tartters memo of 16 February 1972.

Answer

Our comment for specific countries is as follows:

Bulgaria: We have no information that the output of IC's will rise to 10 million a year when the new Botevgrad plant is opened. This would imply that Bulgaria has received, or is planning to receive, additional production machinery and equipment from the West to outfit that plant. We have no evidence of that.

Czechoslovakia: We concur.

East Germany: We concur.

Hungary: We have no evidence that Hungary is aiming for an output of 7 million IC's.

Rumania: We believe Rumanian capability is very small.

USSR: There is no evidence of a mass manufacturing capability.